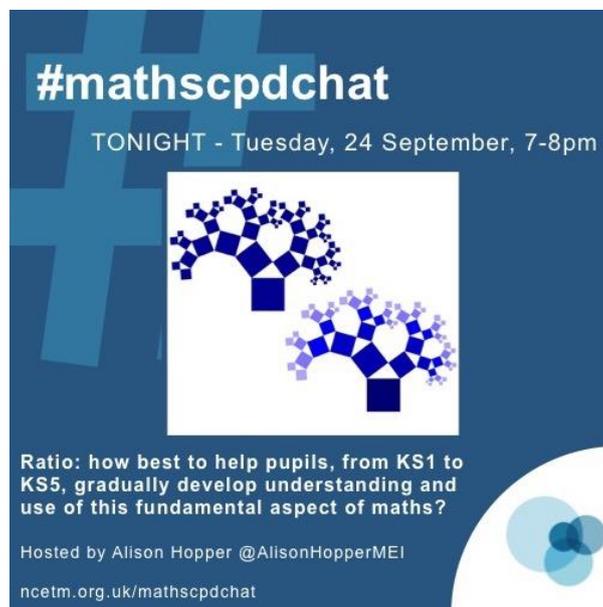


#mathscpdchat 24 September 2019

Ratio: how best to help pupils, from KS1 to KS5, gradually develop understanding and use of this fundamental aspect of maths?

Hosted by [Alison Hopper](#)

*This is a brief summary of the discussion – to see all the tweets, follow the hashtag **#mathscpdchat** in Twitter*



Some of the areas where discussion focussed were:

- that ratio is not a topic, that for example can be 'covered' in three weeks during KS3, but it is a **thread throughout mathematics** and its applications;
- that **experiencing, noticing and 'living-with' ratios starts from a very early age** and precedes attempts to talk about them ... pupils bring a lot of experience of scaling with them when they start school ... that scaling always involves ratio and is an 'innate human skill';
- that **attempts to express ratios start with** the use of phrases such as 'is twice as big as';

- when working with young children not worrying about using the word 'ratio' ... instead giving them **plenty of appropriate experiences (such as in cooking, making models and maps) with encouragement to talk about the idea as it occurs naturally** in their 'noticings';
- the **need to nurture implicit, instructive, valid ways of comparing quantities** ... being explicit is difficult, and explicit knowledge expands as pupils mature;
- **the contexts within which teachers 'introduce' ratio** ... for example, showing a suitable image or object (e.g. a giraffe with an unnaturally long neck) and inviting pupils to say what they think about it;
- **not introducing ratio as unequal sharing;**
- **manipulatives or modes-of-representation** that teachers use (or have used) to 'set up for pupils' situations involving ratios ... examples included Numicon, Cuisenaire® rods, counters, cubes, double-sided counters, bar models, dual number lines, ratio tables, 'any manipulatives', 'a whole range of things';
- **comparing different representations of the same ratio** and challenging pupils to talk about how they are similar;
- that **seeing ratios in a variety of simple contexts** (such as in simple recipes or in packing sweets into bags) is important to pupils;
- focussing on ratio, and then **drawing-it-out, and drawing-on-it** throughout subsequent work;
- providing opportunities for pupils to reach for, **in various different situations**, the same previously acquired **skills of expressing ratios explicitly**;
- the **difficulty for pupils in 'getting-started'** on the solution of word problems involving ratios **when an additive (rather than multiplicative) difference** is a prominent aspect of the given information;
- **using bar models to make sense of word problems** that involve explicitly stated ratios;
- the question '**What are common misconceptions involving ratios**, and how to overcome them' ... there were no responses to this question;
- whether pupils are expected to be **able to use 'formal procedures' for calculating ratios by the end of Key Stage 2** (age 10-11) ... there were no responses to this question;
- that with lower-attaining GCSE candidates, '**sharing using a ratio**' tends to be a **strength**, but students **cannot 'turn ratios into fractions'**.

In what follows, click on any screenshot-of-a-tweet to go to that actual tweet on Twitter.

This is part of a 'conversation' of tweets, about how 'ratio and proportional reasoning' is a thread throughout mathematics with its origins in the earliest experiences of all humans, and that therefore teachers need to nurture instinctive and valid ways of comparing things before 'labelling' them and developing explicit knowledge (which includes conventions and procedures). The conversation was generated by this tweet from [Mary Pardoe](#):

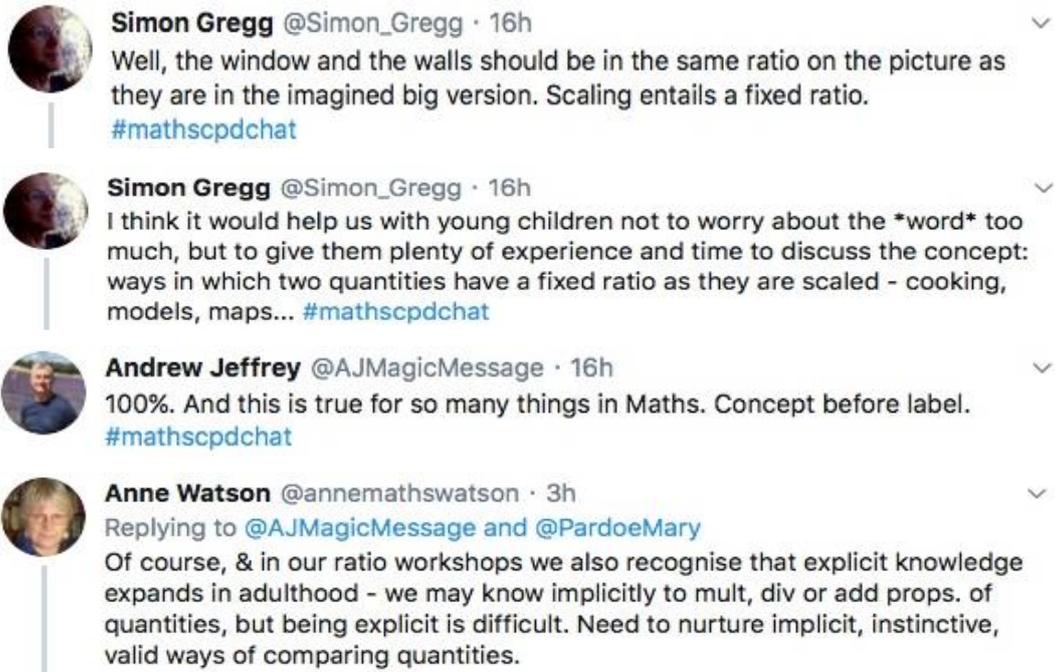


including these from [Andrew Jeffrey](#) and [Mary Pardoe](#):



and these from [Simon Gregg](#), [Andrew Jeffrey](#) and [Anne Watson](#):





(to read the discussion-sequence generated by any tweet look at the 'replies' to that tweet)

Among the links shared were:

[Seven lessons on scaling in Year 4](#) which is a blog by Simon Gregg, illustrated with lovely photos of pupils' work, in which he describes how he spent seven days exploring the idea of scaling with Year 4 pupils. It was shared by [Simon Gregg](#)

[Ratio and proportional reasoning](#) which is the page of the *Key Ideas in Teaching Mathematics* website that provides useful guidance and support for teaching ratio and proportional reasoning. It was shared by [Mary Pardoe](#)

[Key Understandings in Learning Mathematics](#) which is an article by Anne Watson in which she discusses how intuitive ideas that very young children develop provide a basis for their later understanding of mathematics. She uses examples to clarify issues that arise when considering how to build on the natural idea of scaling to develop multiplication as scaling (rather than as repeated addition). It was shared by [Mary Pardoe](#)

[The struggle to achieve multiplicative reasoning 11-14](#) which is an article by Margaret Brown, Dietmar Küchemann and Jeremy Hodgen that addresses difficulties that pupils demonstrate in multiplicative reasoning. It was shared by [Mary Pardoe](#)

[Why might the word 'ratio' cause confusion for students learning trigonometry?](#) which is an article by Gwen Tresidder in which she reflects on how the word 'ratio' often puzzles students when they first encounter trigonometry. It was shared by [Mary Pardoe](#)

[Multiplicative reasoning](#) which is a page of the NCETM Secondary Mastery Professional Development material that provides valuable advice and support for teaching this mathematical theme. It was shared by [Mary Pardoe](#)